

## Claims

What is claimed is:

1. An isolated, purified, or recombinant nucleic acid comprising a polyketide modifying gene, wherein said gene encodes a polyketide modifying enzyme selected from the group consisting of MegR, MegF, MegK, MegCIV, MegCV, MegBVI, MegBIII, MegL, and MegM enzymes.
2. The nucleic acid of Claim 1, wherein said gene encodes a polyketide modifying enzyme selected from the group consisting of MegR, MegK, MegCV, MegCIV, and MegBVI.
3. The nucleic acid of Claim 1, wherein said gene encodes a polyketide modifying enzyme selected from the group consisting of MegF, MegBIII, MegM, and MegL.
4. An isolated, purified, or recombinant nucleic acid comprising genes for the biosynthesis of mycarose for attachment to a polyketide, said enzymes comprising the MegM, MegL, MegBIII, MegBIV, MegDIV, MegBII-2, and MegBVI enzymes.
5. The nucleic acid of Claim 4 further comprising a gene encoding an enzyme for the attachment of mycarose to the polyketide.
6. The nucleic acid of Claim 5 wherein the enzyme for the attachment of mycarose to the polyketide is the MegBV enzyme.
7. The nucleic acid of Claim 4 further comprising a gene encoding an enzyme for hydroxylation of the polyketide.
8. The nucleic acid of Claim 7 wherein the enzyme for hydroxylation of the polyketide is the MegF enzyme.
9. The nucleic acid of Claim 5 further comprising a gene encoding an enzyme for hydroxylation of the polyketide.

10. The nucleic acid of Claim 9 wherein the enzyme for hydroxylation of the polyketide is the MegF enzyme.

11. An isolated, purified, or recombinant nucleic acid comprising genes encoding enzymes for the biosynthesis and attachment of megosamine to a polyketide, said enzymes comprising the MegM, MegL, MegCII, MegBVI, MegDIV, MegDV, MegDII, MegDIII, and MegDI enzymes.

12. An isolated, purified, or recombinant nucleic acid comprising genes encoding enzymes for the biosynthesis of desosamine to a polyketide, said enzymes consisting of the MegM, MegL, MegCII, MegCIV, MegCV, MegDII, and MegDIII enzymes.

13. The nucleic acid of Claim 12 further comprising a gene encoding an enzyme for the attachment of desosamine to the polyketide.

14. The nucleic acid of Claim 13 wherein the enzyme for the attachment of desosamine to the polyketide is the MegCIII enzyme.

15. The nucleic acid of claim 1, wherein the polyketide modifying gene is operably linked to a heterologous promoter.

16. An expression vector comprising the nucleic acid of claim 1.

17. A host cell comprising the nucleic acid of claim 1.

18. A host cell comprising the nucleic acid of claim 4 that expresses a polyketide modifying enzyme encoded by a gene from a mycarose biosynthetic gene set, wherein the enzyme is selected from the group consisting of MegM, MegL, MegBIII, MegBIV, MegDIV, MegBII-2, and MegBVI, Meg BV and MegF.

19. A host cell comprising the nucleic acid of claim 11 that expresses a polyketide modifying enzyme encoded by a gene from a megosamine biosynthetic gene set, wherein the enzyme is selected from the group consisting of MegM, MegL, MegCII, MegBVI, MegDIV, MegDV, MegDVI, MegDVII, MegDII, MegDIII, and MegDI.

20. A host cell comprising the nucleic acid of claim 12 that expresses a polyketide modifying enzyme encoded by a gene from a desosamine biosynthetic gene set, wherein the enzyme is selected from the group consisting of MegM, MegL, MegCII, MegCIV, MegCV, MegDII, and MegDIII, and MegCIII.

21. A method of producing a modified polyketide, said method comprising culturing a recombinant cell comprising a nucleic acid of claim 1 under conditions in which the cell expresses a product of a gene encoded by the nucleic acid of claim 1, and under conditions in which the unmodified polyketide is present, thereby producing the modified polyketide.

22. The method of claim 21 wherein said cell further comprises a recombinant nucleic acid encoding at least one module of a polyketide synthase.

23. The method of claim 21 wherein the cell produces megosamine and can attach megosamine to a polyketide, wherein said cell, in its naturally occurring non-recombinant state cannot produce megosamine.